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EFFECT OF DIFFERENT INOCULUM LEVELS OF *Ascochyta fabae* F. SP. *LENNTIS* ON PLANT GROWTH AND YIELD PARAMETERS OF LENTIL

Talfoor-ul-Hassan[1], Shahbaz Talib Sahi[2], Imran-ul-Haq[2] and Z. Ullah[1,*]

[1]Department of Agriculture, Pest Warning and Quality Control of Pesticides, Hafizabad
[2]Department of Plant Pathology, University of Agriculture, Faisalabad
***Corresponding author's e-mail: zia.uaf2010@yahoo.com**

This study was planned to investigate the effect of different inoculum levels (10^3 spores/ml, $5x10^3$ spores/ml, 10^4 spores/ml and $5x10^4$ spores/ml) of *Ascochyta fabae* f. sp. *lenntis* on plant growth and yield parameters on four different varieties of lentil belonging to resistant and susceptible group, grown in Department of Plant Pathology University of Agriculture Faisalabad. All the varieties showed varying response towards different inoculum levels of *Ascochyta* blight. It was found that with the increase in the inoculum levels there was decrease in plant height, number of leaflets, pods/plant, grains/pod and 100 grain weight and this response was noticed higher in susceptible group as compared to resistant group.
Keywords: Lentil, *Ascochyta*, inoculum level, plant growth

INTRODUCTION

Lentil (*Lens culinaris*medik) locally called masoor belongs to family Leguminoseae (fabaceae). Within the cultivated species of lentil, most common are microsperma and macrosperma (Cubero, 1981). It is most important pulse crop after gram. Lentil contains 28.6 percent protein, 3.1 percent ash, 4.6 percent crude fiber, 44.3percent starch, 36.1 percent amylose, 63.1 percent total carbohydrates providing 420 cal. gross energy 100 g-1 (Bhattyand, 1974). Thus it is a potential substitute of meat especially for poor community. In Pakistan 24 thousand hectares area was under cultivation of lentil with an average yield of 10900 tons which is extremely low as compared to other countries of the world (FAO, 2010). The low yield in Pakistan may be attributed to several factors including many diseases. The most common disease in Pakistan is blight caused by *Ascochyta fabae* f. sp. *lentis*. This disease may result in growth and yield reduction to the extent of 24-59% and 25%, respectively even though environment may be unfavorable for its spread (Kaiser and Hannan, 1986). The main symptoms of lentil blight are purplish brown, shrunken seeds and pod lesions with black pycnidia (Morall and Sheppard, 1981). The disease has a potential to cause appreciable reduction in yield under favorable weather conditions. In susceptible cultivars, yield and seed quality reduction cause income losses of more than 70% and the foliar infection can cause upto 40% yield losses (Gossen and Morall, 1984: Cromey *et al.*, 1987). The disease is perpetuated from season to season by seed borne infection (khan *et al*., 1983) or through diseased plant debris (Gossen and Morall, 1986) and rain splashes also found to be effective mechanism of short distance dispersal of conidia (Pedersen *et al*., 1994c). The disease can effectively be managed by the foliar application and seed dressing fungicides (Rauf *et al*., 1996), use of disease free seed, destruction of plant disease debris (Chaube and Pandey, 1986) and host plant resistance (Iqbal *et al*., 2002; Ahmad *et al*., 2006; Bokhari *et al*., 2011). Keeping in view the importance of *Ascochyta* blight of lentil, there is a still need of comprehensive studies on various aspects of the disease.

MATERIALS AND METHODS

Diseased pods showing characteristics symptoms of blight disease were collected from lentil fields of Department of Plant Pathology University of Agriculture, Faisalabad and kept in refrigerator at 4^oC until used for the isolation and purification was done by spore streak method. *A. lentis* was mass cultured on chickpea grains. To determine the effect of different inoculums levels on vegetative and yield parameters of lentil, four lentil lines namely ILL 358, ILL 2580, ILL 4605 and ILL 6002 belonging to four different types were selected. Among them ILL 358 and ILL 2580 were small seeded (Microsperma type). Out of them ILL 358 was resistant while ILL 2580 was susceptible to this disease. Other two lines i.e. ILL 4605 and ILL 6002 were large seeded (Macrosperma type) with ILL 4605 being the resistant and ILL 6002 was susceptible to the disease. Pots (9" x 6") filled with sterilized soil were sprayed with different inoculum levels and unsprayed as control for each line. Pure culture of *A. lentis* was taken and four different spore suspensions containing 10^3 spores/ml, $5x10^3$ spores/ml, 10^4 spores/ml and $5x10^4$ spores/ml were prepared. To determine the effect of different inoculum levels on growth and yield parameters of lentil plants observations were recorded with ten days interval. To determine the effect of different inoculum levels on plant height, sixteen plants were selected from each line and height measured was compared with respective control. To determine the effect of different inoculums levels on

number of leaflets of lentil plant, leaflets of ten upper compound leaves of sixteen plants of each line were counted and then compared with leaflets of ten upper compound leaves of their respective control lentil plants. Number of pods formed and100 seed weight of lentil plants of each line sprayed with different inoculums levels of *A. lentis* were recorded and compared with their respective control.

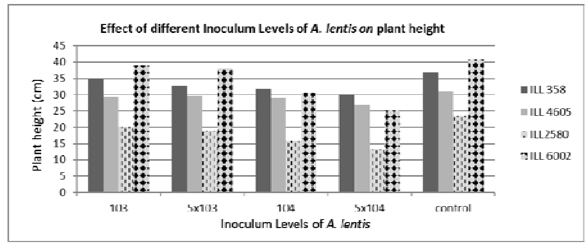
RESULTS AND DISCUSSION

The data analysis of plant heights showed that effect of different inoculum levels was highly significant in both the groups i.e. resistant and susceptible. Similarly varieties within both the reaction groups exhibited statistically high significant effect by different spore concentration. In the resistant group, means of final plant heights inoculated with 10^3 spores/ml, $5x10^3$ spores/ml, 10^4 spores/ml and $5x10^4$ spores/ml were 32.13 cm, 31.11 cm, 30.26 cm and 28.44 cm which were statistically different from one another significantly when compared with control (34.00 cm) as shown in graph 1. In susceptible group, plant height was significantly variable with varying spore concentration. The average plant height in this group at spore concentrations of 10^3 spores/ml, $5x10^3$ spores/ml, 10^4 spores/ml and $5x10^4$ spores/ml was 29.56cm , 28.46 cm, 23.25cm and 19.26cm respectively as compared to control (32.29 cm) that is significantly higher than the plants sprayed with different inoculums levels.

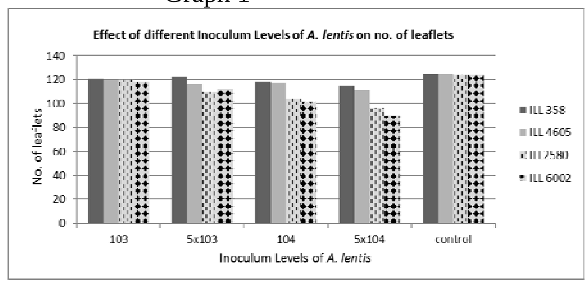
The analyzed data showing effect of different inoculums levels on number of leaflets is given in the graph 2. In the resistant group, the number of leaflets against spore concentrations of 10^3 spores/ml, $5x10^3$ spores/ml, 10^4 spores/ml and $5x10^4$ spores/ml were 120.3, 119.4, 117.8 and 113.1 as compared to control 124.5. On the other hand, the response of varieties in the susceptible group was quite variable as compared to those of resistant group. There was significant decrease in number of leaflets with increasing concentration of spores. Consequently the mean number of leaflets was 119.3, 111.0, 102.9 and 93.25 at spore concentrations of 10^3 spores/ml, $5x10^3$ spores/ml, 10^4 spores/ml and $5x10^4$ spores/ml, respectively.

The data recorded on number of pods/plant is given in the graph 3. In the resistant group, the number of pods/plant inoculated with spore concentrations of 10^3 spores/ml, $5x10^3$ spores/ml, 10^4 spores/ml and $5x10^4$ spores/ml was 11.13, 11.13, 10 and 09 as compared to control 12.25. In susceptible group, there was significantly decreased number of pods/plant as the spore concentration increased. The mean number of pods/plant was 9.5, 9.6, 6.37 and 5.50 at concentrations of 10^3 spores/ml, $5x10^3$ spores/ml, 10^4 spores/ml and $5x10^4$ spores/ml, respectively.

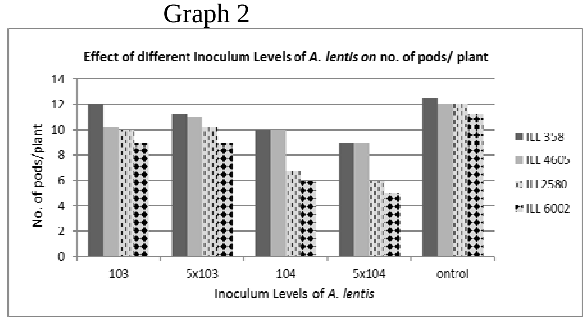
The statistically analyzed data showing the effect of inoculums levels on number of grains/pod has been given in table 4 which indicates that number of grains/pod in both groups is highly significant. In the resistant group, number of grains/pod of plants inoculated with 10^3 spores/ml, $5x10^3$ spores/ml were 1.425 and 1.404 that are statistically similar.



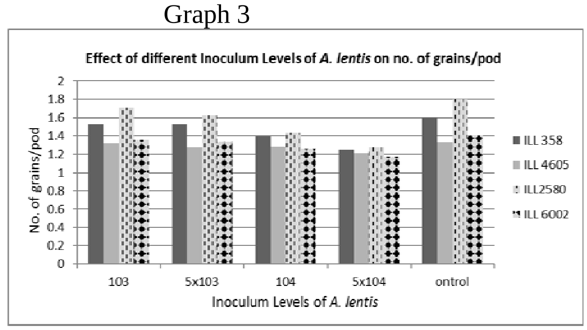
Graph 1



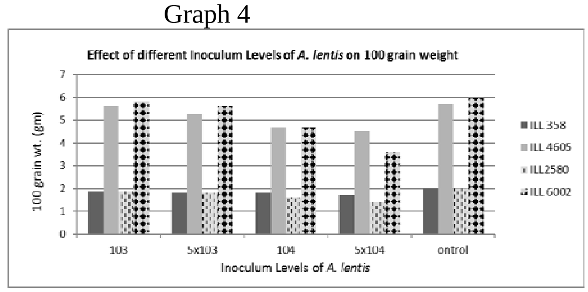
Graph 2



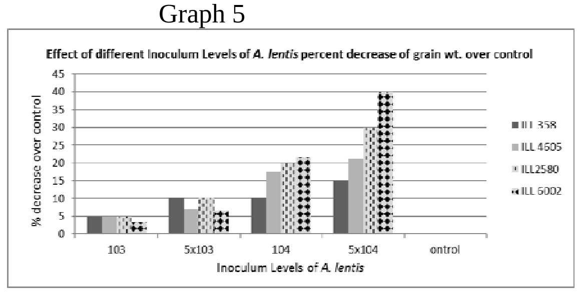
Graph 3



Graph 4



Graph 5



Graph 6

When spore concentration was increased to 10^4 spores/ml and $5x10^4$ spores/ml, number of grains/pod were reduced to 1.337 and 1.229, respectively. The un-inoculated plants had 1.469 grains/pod that are statistically higher than the plants inoculated with all the four concentrations of inoculums levels (graph 4). In the susceptible group, no. of grains/pod of plants inoculated with spore concentrations of 10^3 spores/ml, $5x10^3$ spores/ml, 10^4 spores/ml and $5x10^4$ spores/ml were 1.533, 1.484, 1.349 and 1.224, respectively. It means that with every step increase of spore concentration, number of grains/pod decreased significantly. The data regarding effect of different inoculums levels of *A. lentis* on 100 grain weight along with percent decrease over control of four selected lentil lines has been given in the graph 5 which indicates that as the spore concentration increases from 10^3 spores/ml, $5x10^3$ spores/ml, 100 grain weight decreases and this decrease was higher in susceptible lines (ILL 2580 and ILL 6002) as compared to resistant lines and control. This weight decrease ultimately results in yield reduction (Kaiser and Hannan, 1986) and the only way to combat blight occurrence and its effect on plant growth and yields is the checking of inoculum level and its spread (Chaube and Pandey, 1986) by using various fungicides (Rauf *et al*., 1996).

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